

## **S P C I F I C A T I O N**

**To All Whom It May Concern:**

**Be it known that I, Jimmie L. Johnston, a citizen of the United States of America and resident of Castle Rock, County of Douglas, State of Colorado have invented a certain new and useful**

### **MULTI-LEVEL ACCOMMODATION UNIT**

**of which the following, together with the accompanying drawings comprise a complete specification.**

[00001]

**CROSS-REFERENCE TO RELATED APPLICATIONS**

**Not Applicable**

[00002]

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

**Not Applicable**

[00003]

**REFERENCE TO A MICROFICHE APPENDIX**

**Not Applicable**

[00004]

**BACKGROUND OF THE INVENTION**

[00005]

**Field of the Invention**

[00006]

This invention relates to multi-level building structures providing accommodations for people.

[00007]

**Description of the Related Art**

[00008]

It has long been recognized that apartments, condominiums and other types of accommodation units can be placed in high rise buildings to realize economies not afforded for structures built as individual ground level structures. Various reasons have been proposed for providing such high rise building accommodation units. It may be for example, that land costs prohibit the placement of individual accommodation units at ground level. It may also be that to have a number of accommodation units located in a single high rise structure will provide comfort, security and convenience for persons utilizing such structures.

[00009]

At the present time, for example, there are large numbers of elderly persons needing some measure of healthcare for themselves and desirous of having dignified residences, requiring little care. For such people, it is often advantageous to live in a high rise structure with individual accommodation units but having necessary assistance and convenience accommodation facilities in the same structure.

[00010]       **Generally, cost savings result from the placement of multiple accommodation units in a multi-level building structures. The cost savings make it more affordable for many persons to be able to reside in individual accommodation units. Naturally, if construction costs of the multi-level structure are maintained at a minimum the structure becomes more affordable as a residence for more people. Likewise, if construction costs are kept to a minimum, service and convenience providers can better afford to locate in accommodation units in a multi-level structure.**

[00011]       **With proper construction methods and the use of properly formed core wall structures, a high rise building can be constructed that will provide for a maximum number of accommodation units in a given height of the building. The accommodation units can also be easily modified to meet the needs of different users of such accommodation units.**

[00012]       **It has long been recognized that core walls either pre-fabricated or constructed in place, can be produced that incorporate the placement of connection members for plumbing, electrical, heating and ventilating and other similar systems and the use of such core walls can greatly reduce the construction costs of a building.**

[00013]       **U.S. Patent No. 3,707,165 discloses a plastic plumbing wall having integrally formed surface panels and a foamed core that encloses, supports and positions hot and cold water pipes and drain and vent piping, along with electrical wiring.**

[00014]       **U.S. Patent No. 3,766,574 discloses a pre-fabricated plumbing partition. As disclosed a plumbing assembly is encapsulated in a cellular polyurethane block. Water supply or drain nipples protruding from the block permit two or more such partitions to be joined together to form an easily transported package unit for installation as a building wall.**

[00015] In the past, core walls have included embedded distribution connectors for plumbing, electrical, heating and air conditioning and other similar systems. The embedded distribution connectors are attached to corresponding elements fed into and out of the building in which the core wall is placed, through under-floor chases. The distribution connectors located in the under-floor chases connect to additional main connector components located in vertical chases extending the height of the building. This means that the overall building height must include the height of the under- floor chases.

[00016] Furthermore, with the distribution connectors embedded in a core wall connecting through a floor to corresponding connectors in the under-floor chase, it is necessary to penetrate the floor such that floor strength is weakened and sounds are easily transmitted from one accommodation unit to another, above or below.

[00017] U.S. Patent No. 3,601,937 discloses a multiple story building construction wherein spaced apart parallel foundation beams have service and sewer conduits therein and wherein a service wall unit supported on the first floor of the building extends upwardly beyond a second floor as a core unit having service pipes, a sewer pipe and a vent pipe embedded therein. The service wall can be fabricated and then moved into position over the foundation beams to connect the service pipes, sewer pipes and vent pipes through the corresponding pipes in the wall core.

[00018] U.S. Patent No. 3,821,818 discloses a unitary building wall having a plurality of sets of passageways disposed therein. The passageways serve as conduits for introducing necessary utilities to dwelling units and a plurality of sets of tree-like passageways are provided. The unitary building wall can be fabricated off-site and can be moved into position within a supporting wall structure of a building. The building wall can be stacked vertically.

[00019] U. S. Patent No. 3,842,320 discloses a pre-fabricated insulated wall with electrical circuit connectors housed therein.

[00020] U.S. Patent No. 3,909,912 also discloses a pre-fabricated electrical wall structure.

[00021] U.S. Patent No. 4,919,164 discloses a pre-fabricated wall panel using wall studs and placement of service lines and drains within the walls to extend through the wall studs. Wall studs, together with a top frame plate and a bottom frame plate form a pre-formed wall structure that is positioned within buildings.

[00022] U.S. Patent No. 6,438, 903 discloses a panelized construction system. The panelized construction system of the invention is intended to provide interior and exterior walls of an add-on structure for an existing house, or the like.

[00023] With the cost of land, particularly in urban areas, being high and consistently rising, it is important to be able to construct people accommodation units that will comfortably accommodate people while using a minimum amount of such valuable land. Consequently, it has been found very desirable to build upward from the ground, with buildings that will suitably accommodate people who do not need, or no longer need, large living spaces, as well as meeting social, personal and commercial needs of people. With high rise accommodation units, it is possible to comfortably accommodate large numbers of people and if the construction costs for such buildings are maintained as low as possible, many more people can afford to utilize the buildings, when completed.

[00024] In the past, core walls have included embedded plumbing, electrical, heating and air conditioning and other similar connection members. The embedded connection members of core walls are connected to corresponding distribution connectors fed into and

**out of the building in which the core wall is placed through vertical and under-floor chases. The distribution connectors located in the under-floor chases attach to main connectors located in vertical chases extending essentially the height of the building. The vertical chases are formed independently of the core walls and the connection members in the core walls connect to distribution members in the under-floor chases and then penetrate the walls of the vertical chases to connect to corresponding distribution connectors in the vertical chases. This means that the overall building height must include the height of the under-floor chases and the building must be made large enough to accommodate the vertical chases formed in the common areas.**

**[00025] Space for the vertical chases is normally provided in hallways or common areas in the buildings in which the core walls are installed.**

**[00026] With connection members embedded in a core wall connecting through a floor to corresponding distribution connectors in an under floor-chase, it is necessary to penetrate the floor such that floor strength is weakened and sounds are easily transmitted from one dwelling unit to another, above or below.**

**[00027] Even if core walls have connection members that connect through an end of the core wall to a vertical chase, the chase is generally formed with construction of the floor of the building and the connection members at the end of the core wall feeding into the vertical chase, located in the hallway or other common building space.**

**[00028] The core wall of the present invention is constructed to accommodate use in any selected people accommodation, i.e., dwelling, office, shop, etc.**

**[00029] The structure of the present invention has a low ceiling height requirement for individual people accommodations, utilizing core walls pre-formed off-site and placed in the**

accommodations in a manner to facilitate easy placement and connection of service lines, electrical lines and disposal lines, for example. The core walls are constructed to have a vertical chase and components arranged such that when placed in accommodation units the only penetration of the dwelling floor is at the vertical chase and the vertical chase is made to include part of the core wall, so that additional building space is not required for a separate vertical chase.

[00030]

#### OBJECTS OF THE INVENTION

[00031] Principal objects of the present invention are to provide a people accommodating building that will incorporate reduced height between floors of the building; a reduction of floor plane penetrations that traditionally weaken multi-level buildings; and to reduce sound transmission between upper and lower accommodation units.

[00032] Another object is to provide a core wall with a vertical chase formed therein so that a separate vertical chase, requiring connectors for the building is not required in common space of the building.

[00033] A core wall of the invention has the necessary plumbing, electrical, heating and cooling connection members and any other such connection members, embedded therein and connected to couplings at one or both faces of the core wall to connect to a wide variety of auxiliary components, such as toilets, bathtubs, showers, sinks, heating and air conditioning and gas and electric powered appliances. In addition, the core wall is constructed such that all of the connection members from within the wall connect to corresponding main connectors in a vertical chase that is formed as a portion of the core wall. Some, or all, of the connector members may be connected to auxiliary components in any given people accommodation. For any such people accommodation some of the connection members may

not be used. The core wall also serves as a positive sound barrier between accommodation units at opposite sides of the core wall.

[00034] **FEATURES OF THE INVENTION**

[00035] Principal features of the invention include the use of a core wall that may be manufactured off-site or at the site of construction of a multiple story accommodation units. The core wall has exterior wall surfaces constructed of required materials of a strength and thickness necessary to meet building standards in the location in which the accommodation units are being constructed. The exterior surfaces of each core wall are spaced apart and connection members for plumbing, electrical, heating and air conditioning systems along with vents and other structures necessary for the comfort of people in the constructed accommodation units are incorporated between the opposite wall surfaces of the core wall.

[00036] A vertical chase is provided between a portion of the faces of each core wall and the connection members within the core wall are attached to corresponding main connector members extending vertically through the chase and aligned floor openings.

[00037] The connection members connect through one or both faces of the core wall to standard convenience components, such as toilets, bathtubs, showers, sinks, electrical outlets and fixtures, heating and cooling apparatus, vents and the like.

[00038] Additional objects and features of the invention will become apparent to a person skilled in the art to which the invention pertains from the following drawings, detailed description and claims.

[00039] **BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWINGS**

[00040] **In the Drawings**

[00041] **Fig. 1 is an elevation view of a core wall, as conventionally found in high rise people accommodation units;**

[00042] **Fig. 2, a sectional view through a conventional core wall and showing plumbing, heating, electrical and other standard components connected as distribution members from within the wall to corresponding distribution members in an under-floor chase and then to corresponding main connectors in a vertical chase of a conventional people accommodation unit;**

[00043] **Fig. 3, a view like that of Fig. 1, but showing the people accommodation units of the present invention;**

[00044] **Fig. 4, a view like that of Fig. 3 with a face panel of the core wall removed to show the interior construction of the core wall and the chase in the core wall;**

[00045] **Fig. 5, a fragmentary sectional view taken on the line 5-5 of Fig. 3;**

[00046] **Fig. 6, an enlarged view of the area within line 6-6 of Fig. 5;**

[00047] **Fig. 7, a vertical section taken on line 7-7 of Fig. 3;**

[00048] **Fig. 8, an enlarged section taken on line 8-8 of Fig. 3;**

[00049] **Fig. 9, an enlarged section taken on line 9-9 of Fig. 3, a fragmentary sectional view taken through a typical core wall of the invention;**

[00050] **Fig. 10, an enlarged vertical section through a portion of a typical core wall of the invention;**

[00051] **Fig. 11, a view like that of Fig. 10, but showing channel members as interior stud components of the core wall;**

[00052] Fig. 12, a view like that of Figs. 10 and 11, but showing still another embodiment of the core wall of the invention, utilizing additional support components;

[00053] Fig. 13, a view like that of Fig. 5, but showing standard convenience components positioned at both sides of a core wall; and

[00054] Fig. 14, a view like that of Fig. 7, but also showing standard convenience components at both sides of a core wall.

[00055] DETAILED DESCRIPTION

[00056] Referring now the Drawings

[00057] Prior Art

[00058] As shown in Figs. 1 and 2, conventional multi-story buildings often include a floor 10 of people accommodation unit 12 and a floor 14 of a people accommodation unit 16 positioned directly above the lower accommodation unit 12. As shown, each accommodation unit 12 and 16 includes a shower 18, a toilet 20, and a lavatory 22 as standard convenience components in the accommodation unit.

[00059] A ceiling 24 for each accommodation unit is suspended from the floor 14 above, by wires 26. The space between floor 14 and ceiling 24 serves as an under-floor chase 28 in which distribution connection members for standard convenience components, i.e., plumbing, electrical, heating and air conditioning components are located. More specifically, a water inlet conduit 30 extends as a connection member through a wall 32 of a vertical chase 33 and into the under-floor chase 28. The water inlet conduit 30 is connected by a line 34 into a core wall 36 and to a conduit 38 extending vertically through the core wall 36. Water line 34 is attached by connecting lines 40 through the core wall to the shower 18, toilet 20 and lavatory 22. Drain lines 44 and 46, respectively, from the shower and the toilet, connect to a

drain pipe 48 within the under ceiling chase 28 and extend through the wall 32. The water inlet pipe 30 and drain line 44 are connected to inlet and drain lines located in vertical chase 33, after passing through wall 32. Other accommodation units above and/or below accommodation unit 12 and 16, similarly have water lines 30 and drain lines 44 and 46 extending downwardly into the under ceiling chases positioned between the floor 14 of an upper accommodation unit and the ceiling 24 of a lower accommodation unit and such pipes pass through a wall 32 to connect to pipes in the vertical chase 33.

[00060] Each core wall 36 is mounted between a floor 10 and floor 14 and holes 52 are punched through the floors 10 and 14 to provide for coupling of the conduits 38 in the vertically stacked core walls and through the floors 10 and 14. Clearly, other conduits, electrical lines and other connection components can run through the horizontal under-floor chase 28, through the wall 32 and into the vertical chase 33 for connection to vertically extending connectors, i.e., pipes and elements (not shown) extending the height of the building within such vertical chase.

[00061] THE INVENTION

[00062] In the embodiment of the invention shown in Figs. 3-14, a slab 60 has a face 60A that serves as a floor for an accommodation unit 62 and has a surface 60B that is a ceiling for an accommodation unit 64. Another slab 66 similarly has an upper surface 66A that serves as a floor for accommodation unit 64 and a lower surface 66B that serves as a ceiling for an accommodation unit 74 located beneath accommodation unit 64. A core wall 68 extends between support walls 70 and 72 of the upper accommodation unit 62 and a similar core wall 76 extends between support walls 78 and 80 of the lower accommodation unit 64.

**The core walls 68 and 76 are identically constructed and each extends from the floor of the associated accommodation unit to the ceiling thereof.**

**[00063] In Figs. 3 and 4 a lavatory 82 is suspended from a face of each core wall 68 and 76 and a rear discharge toilet 84 rests on the floor surface of each slab 60 and 66. A shower 86 is also mounted on the floor of each slab 60 and 66 and has a raised shower pan 88 in the bottom of the shower.**

**[00064] If desired, a medicine cabinet 90, a light 92 and an exhaust fan 94 may also be mounted to the face of each core wall. A fire and smoke detector 96 may be mounted to the face of core wall 76 and sprinklers 98, operated by actuation of detector 96, may be spaced along and project from the face of the core wall. A gas line coupling 100 projects to the face of the core wall 76 and an electrical outlet 102, which may accommodate a variety of electrical devices, may be positioned to project to the wall face. Clearly more than one such water or gas line and electrical outlet may be provided at a face of the core wall.**

**[00065] Each core wall 68 and 76 includes a pair of spaced apart wall panels 106 and 108 of required thickness and strength. The wall panel 106 and 108 extend fully between the accommodation unit support walls 70, 72, 78 and 80. They also extend between the ceiling and floor surfaces of the accommodation units, such as the ceiling surface 60B of slab 60 and the floor surface 66A of slab 66. A vertical chase 110 is formed within each core wall 68 and 76 and a removable access panel 112 may be provided in a wall surface 106 to allow access to the chase 110 and to facilitate coupling of connection members and connector members. The chase 110 in each core wall extends vertically, fully through the core wall from a bottom edge to a top edge to receive vertical connector members for plumbing, electrical and venting systems. The remainder of the space between wall panels 106 and 108 is filled with a**

**structural foam core 116 that embeds connection members extending into the core walls and into the vertical chase to be connected to the vertical connector members. The vertical chases 110 of core walls 68 and 76 are aligned and openings 118 provided through the slabs 60 and 66 between the aligned chases 110 allow vertically extending connector members in chases of vertically aligned core walls to be connected.**

**00066] The lavatory 82, rear discharge toilet 84 and shower 86, if any, of each accommodation unit, are all positioned such that their discharges will be directed into the chase 110 of the core wall of the accommodation unit. Thus, the discharge for lavatory 82 connects to fitting 120 projecting through the face of the core wall 110 and through a discharge line connector 122 to a vertically extending waste line connector member 124. The waste from toilet 84 also discharges through a coupling on the outer surface of core wall 76, into a discharge line connector 122 and into the waste line 124 connector member. Waste water from the shower 86 is discharged through a coupling on the face of core wall 76 into a waste line connection member 126. The waste line connection members 124 and 126 each connect into a vertical main waste line connector member 128 extending vertically through the aligned chase 110 and through slabs 60 and 66 of the accommodation units.**

**[00067] Hot and cold water line connector members 132 and 134 extend vertically through the chase 110 to a mixing valve 136 that is connected by connector lines 138 and 140 to couplings 142 and 144, respectively, of the control valve 146 of the lavatory 82. Similarly, hot and cold water line connector members 150 and 152 extend vertically through the chase to a mixer valve 154 and then through connection lines 156 and 158, respectively, to couplings 160 and 162. The couplings 160 and 162 are connected to a mixer valve 164 of the shower 86.**

[00068] Another cold water inlet line connector member 170 extends vertically through the chase 110 and is connected to each of the sprinklers 98 spaced along the face of the core wall 76 by a connection line 172. Water meters 174 are provided in the water inlet lines and the water meters are electrically connected to a electronic readout meter 176. Meter reader 176 is positioned on the outside of wall 70 where it can be viewed from outside the accommodation unit or accommodation units for which it is connected. An electrical duct connector member 178 receives the electrical wiring vertically through the chase 110 and the wiring is connected via connection members to the various electrical components, including the meter 176 and electrical and telephone outlets, such as shown at 102. Telephone and internet connection members are connected to connection members in the chase 110 and are then connected to some of the outlets 102 provided therefore in a surface of the core wall 76.

[00069] An exhaust duct or vent connector member 190 extends vertically through the chase 110 and is connected to exhaust fan 94 via a connection member such that air from the accommodation unit exhausted by fan 94 is discharged through the duct 190 or is recirculated. A gas line connector member 192 extends vertically through the chase 110 and a connection line 194 interconnects the line 192 and a coupling 160 projecting to a face of the core wall. A gas meter 196 in line 194 is connected to the electronic readout meter 176 to provide for reading of the amount of gas passed through line 194.

[00070] The access panel 112 opens to allow access to the interior of the chase 110 and is made of a suitable material that will provide sound insulation, as well as sufficient strength. Structural foam 116 is provided at the opposite sides of chase 110, as well as around the connection members extending into the core wall from the chase 110 for connection to the sprinklers electrical outlets and other components extending to an outside face of the core

wall. The structural foam 116 extends fully around the chase 110 and provides a seal at each hole 118 in a floor through which the vertical connector members passed through the vertically aligned chases 110 are connected. It should be noted that the only penetration required through adjacent floors of the vertically positioned dwelling units is the hole 118 provided to allow the vertically extending connector members through chases 110 to be connected.

[00071] As best shown in Figs. 8 and 9, the core walls 68 and 76 preferably each have gypsum board sheets 200 on opposite faces thereof. One or more sheets of oriented strand board 202 or other suitable material that will meet code requirements, such as strong wood, metal or plastic material is positioned inside each of the gypsum board faces. A U-shaped channel member 204 fits over the top of each core wall and snugly against the ceiling surface 60B of an upper slab 60. L-shaped brackets 206 have one leg 208 nailed into the ceiling surface 60B and another leg 210 extending into the structural foam core to be secured by nails 212 inserted through the gypsum board and/or oriented strand board and the leg 208. Crown moldings 218 are provided between the ceiling 60A and the upper ends of the core walls to hide the connecting structure.

[00072] In similar fashion, a U-shaped channel 220 is provided at the bottom of each face of the core wall 68 and 76 and L-shaped brackets have one leg nailed into the floor 66A and one leg extending into the foam material 116 of the core wall. Nails 224 in the legs secure the core wall to the floor and base moldings 226 may be provided to hide the adjustment means.

[00073] Figs. 10, 11 and 12 show various embodiments of construction of core walls. As shown in Fig. 10, the core wall 228 has outer surfaces 230 and 232 formed from gypsum

board and/or other good sound insulating material. The gypsum board is placed over an oriented strand board 234 and the space between the separated oriented strand boards is filled with structural foam 116.

[00074] As shown in Fig. 11, the same construction is used for the wall core 236, including the gypsum board facings 238, the inner layers 240 of oriented strand boards and structural foam material 116 between them. However, spaced apart U-shaped channel members 242 are provided as studs between the faces of the panel to provide additional strength to the core wall. It will be apparent that connection members passed through the core wall 236 will pass through openings 246 provided in the channel members 242 to accommodate passage of such connection members.

[00075] Fig. 12 shows still another embodiment of core wall of the invention. In this embodiment, core wall 250 has the spaced apart gypsum board facing 252 and oriented strand board sheets 254 separated by a structural foam core 116 having spaced apart facing channel members 256 as studs therein. In this embodiment it will be apparent that connector members pass through the structural foam of the core wall can pass between the opposing channel members.

[00076] Figs. 13 and 14 show an arrangement wherein a lavatory 260, toilet 262 and shower 264 or bathtub 265 are provided at each side of a core wall 266. In such an arrangement a vertical chase 268 in the core wall serves to accommodate connectors for both sets of fixtures. In the embodiment shown in Figs. 13 and 14, as well as in all other embodiments of the invention, it is not necessary to have an under-floor chase; it is not necessary to have a number of openings through each floor of stacked accommodation units and sound insulation is maintained between accommodation units.

[00077] With each toilet and shower or bathtub supported on a floor 60A, the rear discharge line for each devise is connected through a face of the core wall to a discharge conduit connector member in the chase.

[00078] A discharge conduit connection member 300 extends from connection with vertical discharge connector member conduit 170 in the chase 110 into the core wall 76 between the outer panels 106 and 108. The discharge conduit connection member 300 is sloped downwardly through the core wall to connect to the vertical discharge connector member conduit 170. The slope of the discharge connection member conduit 300 allows other devices such as the sink 304 shown in Fig. 5 to be hung on the core wall, outside of the chase 110 and to have a drain line connection 202 connected to sloped drain line 300 inside the core wall. Similarly, electrical lines embedded in the core wall can be connected to outlets at the face of the core wall to allow connection to other devices and appliances, such as the stove 306.

[00079] Each of the core walls disclosed is preferably constructed off site in the same manner. Not all connection members inside the core wall used will necessarily connect convenience components at one or both faces of the core wall to connector members in the vertical chase portion of the core wall. Nevertheless, such connection members are provided and even if not used for an accommodation unit at the time of building construction are available for use in the event of subsequent modification of the accommodation unit.

[00080] The chase formed in each core wall allows toilets, bathtubs and showers which are too heavy to hang and to be supported on a face of the core wall, to be floor mounted and supported and to be rear discharged directly into the chase. At the same time, convenience devices, such as bathroom and kitchen sinks, which do not have the weight of a person placed

thereon can be secured to a face of the core wall. Those can discharge directly into a connector member in the chase or to the sloped connection drain member in the core wall and then into the connector member in the chase.

[00081] Without an under-floor chase requirement, a height from floor to floor of each stacked dwelling is less than that found in buildings having under-floor chases. As a result, the height requirement for each accommodation unit is greatly reduced and more construction savings are realized as a result of such height savings.

[00082] Although a preferred form of my invention has been herein disclosed, it is to be understood that the present disclosure is by way of example and that variations are possible without departing from the subject matter coming within the scope of the following claims, which subject matter I regard as my invention.